



**NEW MEXICO ENVIRONMENT DEPARTMENT
GROUND WATER QUALITY BUREAU
UNDERGROUND INJECTION CONTROL
GENERAL DISCHARGE PERMIT**



Certified Mail- Return Receipt Requested

Facility Name: Turner Branch Groundwater Remediation Site
Facility Location: 815 NM 333, Tijeras, New Mexico
Section 7, T 10 N, R 6 E
Bernalillo

Legally Responsible Party: New Mexico Environment Department
Petroleum Storage Tank Bureau
121 Tijeras Avenue NE, Suite 1000
Albuquerque, NM 87102
505-222-9561

Remediation Oversight Agency Contact: New Mexico Environment Department
Petroleum Storage Tank Bureau
Michael Leger (Project Manager)
505-372-8337

Remediation or Injection Plan Identification: "Phase 5 Remediation Workplan for Turner Branch Source Area" (Injection of 15% PersulfOx solution in extraction well MPE-1)

Permitting Action: New

PPS Contact Jason Herman (505)827-2713
jason.herman@state.nm.us

EFFECTIVE DATE: **TERM ENDS:**

Michelle Hunter
Chief, Ground Water Quality Bureau

[Subsection H of 20.6.2.3109 NMAC, NMSA 1978, § 74-6-5.I]

I. UIC GENERAL DISCHARGE PERMIT

The New Mexico Environment Department (NMED) Ground Water Quality Bureau (GWQB) issues this Underground Injection Control General Discharge Permit (UIC Permit) for the subsurface emplacement of additive fluids through a Class V UIC injection well for the purpose of facilitating vadose zone or groundwater remediation. The GWQB issues this UIC Permit to New Mexico Environment Department-Petroleum Storage Tank Bureau (Permittee) pursuant to the New Mexico Water Quality Act (WQA), NMSA 1978 §§74-6-1 through 74-6-17, and the New Mexico Water Quality Control Commission (WQCC) Ground and Surface Water Protection Regulations, 20.6.2 NMAC.

In issuing this UIC Permit, the GWQB has determined that the requirements of Subsection C of 20.6.2.3109 NMAC have been met. The activities authorized by this UIC Permit are principally governed by Phase 5 Remediation Workplan for Turner Branch Source Area (Injection Plan), under the authority of NMAC 20.5.119.1925 through 1929 - Corrective Action for Storage Tank Systems Containing Petroleum Products, with oversight by the Petroleum Storage Tank Bureau-Remedial Action Program. Compliance with this UIC Permit requires compliance with the terms, requirements, and conditions of the Injection Plan. The term of this UIC Permit shall be no longer than five years from the effective date of this UIC Permit.

The injection activities, the location of the injection site, the type of injection and quantities of additives being used are briefly described as follows:

Injection Activities (summary: including injection well type, number of wells, and injection frequency)

Copy of the Injection Plan Attached (required):

The attached workplan provides methods and specifications for mixing PersulfOx and clean potable water for injection of a 15% solution into existing extraction well MPE-1. Two injection events will be performed.

Injection Site Information

Depth to groundwater: Approximately 42 ft

Existing concentration of total dissolved solids (TDS) in groundwater: 872 mg/L

Location: Adjacent vacant land west of Sunwest Alternative Fuels on the north side of NM 333, 0.25 mile west of Zuzax overpass

County: Bernalillo

Latitude: 35.103643

Longitude: -106.344694

Map Showing Area of Injection Sites Attached (required) -:

Additives Being Used (including volumes, manufacturer, and mixing ratios)

PersulfOx™ by Regenesis.
9,036 pounds of PersulfOx and 6,136 gallons of clean potable water
6,588 gallons total
3,294 gallons per injection event; 2 injection events; 2 weeks apart
Mixed onsite in 300-gallon batches
Ratio of PersulfOx powder to water is approximately 1.47 pounds per 1 gallon
Injection into the shallow aquifer by gravity drainage using well MPE-1
Depth to groundwater is approximately 42 feet

Anticipated Precipitation, Dissolution, Adsorption, and Desorption Products

Anticipated Increases: dissolved oxygen, pH, oxidation-reduction potential, alkalinity and sulfate.
Anticipated Decreases: dissolved iron, dissolved manganese, BOD, COD and petroleum contaminants.
Anticipated Precipitants: reduced-state Fe and Mn will precipitate as solid oxides.
The hydrogeologic regime will change from anaerobic to aerobic due to injection of persulfate oxidant.
With persulfate oxidation, the end products are primarily carbon dioxide and sulfate. Unconsumed sodium persulfate naturally degrades to sulfate and sodium after injection.

Public Notice Posting Locations

2 inch by 3 inch Newspaper Ad required for Renewal applications.
Newspaper: Not Applicable – New Application
3 inch by 4 inch Newspaper Ad required for New, Modification, and Renewal/Modification applications.
Newspaper: The Independent (Published in Edgewood; Circulated Throughout East Mountains)
2 feet by 3 feet sign posted for 30 days in a location conspicuous to the public at or near the facility required for New, Modification, and Renewal/Modification applications.
Sign Location: Sign post installed on-site, facing NM 333
8.5 inch by 11 inch or larger posted off-site location conspicuous to the public (e.g. public library).
Required for New, Modification, and Renewal/Modification applications.
Flyer Location: Village of Tijeras Public Library

This UIC Permit consists of the complete and accurate completion of this UIC Permit form as determined by the GWQB.

Issuance of this UIC Permit does not relieve the Permittee of the responsibility to comply with the WQA, WQCC Regulations, and any other applicable federal, state and/or local laws and regulations, such as zoning requirements and nuisance ordinances.

Signatures

Signature must be that of the person listed as the legally responsible party on this application.

I, the applicant, attest under penalty of law to the truth of the information and supporting documentation contained in this application for an Underground Injection Control General Discharge Permit.

Applicant's Signature

Signature:



Lorena Goerger

Date:

3/19/2020

**PSTB Remedial Action
Program Manager**

Printed Name:

Title:

II. FINDINGS

In issuing this UIC Permit, GWQB finds:

1. The Permittee is injecting fluids so that such injections will move directly or indirectly into groundwater within the meaning of Section 20.6.2.3104 NMAC.
2. The Permittee is injecting fluids so that such fluids will move into groundwater of the State of New Mexico which has an existing concentration of 10,000 mg/L or less of TDS within the meaning of Subsection A of 20.6.2.3101 NMAC.
3. The Permittee is using a Class V UIC well as described in 20.6.2.5002(B)(5)(d)(ii) NMAC for in situ groundwater remediation by injecting a fluid that facilitates vadose zone or groundwater remediation.
4. The Permittee is injecting fluids into groundwater in order to achieve the remediation goals identified in the Injection Plan.

III. AUTHORIZATION TO DISCHARGE

The Permittee is authorized to inject chemical additives into groundwater in accordance with this UIC Permit and the Injection Plan under the oversight of PETROLEUM STORAGE TANK BUREAU.

[20.6.2.3104 NMAC, Subsection C of 20.6.2.3106 NMAC, Subsection C of 20.6.2.3109 NMAC]

IV. CONDITIONS

The conditions of this UIC Permit shall be complied with by the Permittee and are enforceable by GWQB.

1. The Permittee shall perform remediation activities in accordance with the Injection Plan and shall notify GWQB of any changes prior to making them.

[20.6.2.3107 NMAC]

2. The Permittee shall monitor the injection activities and their effects on groundwater quality as required by the Injection Plan and shall provide GWQB with electronic copies of the required reporting and any pertinent documentation of activities at the site.

[20.6.2.3107.A NMAC, 20.6.2.3109.A NMAC]

3. If GWQB or the Permittee identifies any failure of the Injection Plan or this UIC Permit to comply with 20.6.2 NMAC not specifically noted herein, GWQB may require the Permittee to submit a corrective action plan and schedule for completion of corrective actions to address the failure.

Additionally, the GWQB may require the Permittee to submit a proposed modification to the Injection Plan, this UIC Permit, or both.

[20.6.2.3107.A NMAC, 20.6.2.3109.E NMAC]

4. ADDITIONAL MONITORING REQUIREMENTS – (RESERVED)
5. TERMINATION – Within 30 days of completion of activities authorized by this UIC Permit the Permittee shall submit a closure report and a request to terminate the UIC Permit to the GWQB for its approval. The closure report shall identify how the injection well(s) was (were) closed in accordance with the Injection Plan. The Permittee shall provide [PETROLEUM STORAGE TANK BUREAU] with a copy of this closure report.

[20.6.2.5005 NMAC, 19.27.4 NMAC]

6. INSPECTION and ENTRY – The Permittee shall allow a representative of the NMED to inspect the facility and its operations subject to this UIC Permit and the WQCC regulations. The GWQB representative may, upon presentation of proper credentials, enter at reasonable times upon or through any premises in which a water contaminant source is located or in which are located any records required to be maintained by regulations of the federal government or the WQCC. The Permittee shall allow the GWQB representative to have access to, and reproduce for their use, any copy of the records, and to perform assessments, sampling or monitoring during an inspection for the purpose of evaluating compliance with this UIC Permit and the WQCC regulations. Nothing in this UIC Permit shall be construed as limiting in any way the inspection and entry authority of GWQB under the WQA, the WQCC Regulations, or any other local, state, or federal regulations.

[20.6.2.3107.D NMAC, NMSA 1978, §§ 74-6-9.B and 74-6-9.E]

7. MODIFICATIONS and/or AMENDMENTS – In the event the Permittee proposes a change to the injection plan that would result in a change in the volume injected; the location of the injections; or the concentration of the additives being injected by the facility, the Permittee shall notify GWQB prior to implementing such changes. The Permittee shall obtain approval (which may require modification of this UIC Permit) by GWQB prior to implementing such changes.

[20.6.2.3107.C NMAC, 20.6.2.3109.E and G NMAC]

8. COMPLIANCE with OTHER LAWS – Nothing in this UIC Permit shall be construed in any way as relieving the Permittee of the obligation to comply with all applicable federal, state, and local laws, regulations, permits, or orders.

[NMSA 1978, § 74-6-5.L]

9. PERMIT FEES – Payment of permit fees is due at the time of UIC Permit approval. Permit fees shall be paid in a single payment remitted to GWQB no later than 30 days after the UIC Permit effective date.

Permit fees are associated with issuance of this UIC Permit. Nothing in this UIC Permit shall be construed as relieving the Permittee of the obligation to pay all permit fees assessed by GWQB. A Permittee that ceases injecting or does not commence injecting during the term of the UIC Permit shall pay all permit fees assessed by GWQB. An approved UIC Permit shall be suspended or terminated if the facility fails to remit a payment by its due date.

[20.6.2.3114.F NMAC, NMSA 1978, § 74-6-5.K]

APPENDIX A

**WORKPLAN FOR GROUNDWATER MONITORING
AND INJECTION OF PERSULFOX™**

July 30, 2019

Mr. Michael Leger
New Mexico Environment Department
Petroleum Storage Tank Bureau
121 Tijeras Avenue NE, Suite 1000
Albuquerque, NM 87102

RE: Phase 5 Remediation Workplan for Turner Branch Source Area
Indian Hills Complex, Highway 333 East, Tijeras, New Mexico
State Lead Contract No. 18-667-3200-0023
Facility #28654 SID #611

Dear Mr. Leger:

Haller & Associates, Inc. (HAI) is pleased to submit this workplan and costs to resume soil and groundwater remediation at the Turner Branch source area within the Indian Hills Complex in Tijeras, New Mexico. The scope of this workplan is based on the technical approach presented in our remediation proposal for the Indian Hills Complex dated April 4, 2018.

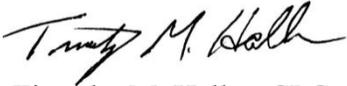
This workplan was originally submitted on February 15, 2019. The workplan supersedes all previous versions, and addresses comments received from the Petroleum Storage Tank Bureau (PSTB) in March, April and July 2019.

All work within the Indian Hills Complex is subject to the provisions of Professional Services Contract #18-667-3200-0023.

If you have questions or comments, please call me at (505) 281-9333.

Sincerely,

HALLER & ASSOCIATES, INC.



Timothy M. Haller, CPG
VP / Hydrogeologist

Attachments: Turner Branch Site Remediation Workplan
Tables
Figures
Regenesis Proposal

TABLE OF CONTENTS

1.0	BACKGROUND AND OBJECTIVES	1
2.0	BASELINE GROUNDWATER MONITORING EVENT	2
2.1	Notifications.....	2
2.2	Water Level Measurements	2
2.3	Groundwater Sampling and Analysis	2
2.4	Private Well Sampling and Analysis	2
2.5	Baseline Groundwater Monitoring Report	3
3.0	DISCHARGE PERMIT APPLICATION AND PUBLIC NOTICE.....	4
4.0	REMEDIATION SYSTEM O&M	5
4.1	Notifications.....	5
4.2	Pre-Startup Inspection and Maintenance.....	5
4.3	Regularly Scheduled O&M.....	5
4.3.1	Record System Operating Parameters.....	5
4.3.2	Visual Inspection, Cleanup, Site Security, and Identification of Problems.....	6
4.3.3	Equipment Maintenance	6
4.3.4	Gauging of Groundwater and NAPL Levels	7
4.3.5	Gauging of Field Vacuum	8
4.3.6	PID, Oxygen and LEL Readings at the SVE Manifold and Header	8
4.3.7	Collection of System Performance Samples	8
4.3.8	Monthly Status Reports.....	8
5.0	IN-SITU CHEMICAL OXIDATION EVENTS	9
5.1	PersulfOx Solution Preparation	9
5.2	PersulfOx Injection Strategy	9
5.3	PersulfOx Injection Report.....	10
6.0	QUARTERLY GROUNDWATER MONITORING.....	11
6.1	Groundwater Monitoring Methodologies.....	11
6.2	Quarterly O&M and Groundwater Monitoring Reports	11
7.0	SEQUENCE OF EVENTS.....	12
8.0	DELIVERABLES AND COSTS	13
8.1	Baseline Groundwater Monitoring and Report.....	13
8.2	Discharge Permit Application and Public Notice	13
8.3	Remediation System O&M and Reports	13
8.4	PersulfOx Injection Events and Report.....	13
8.5	Quarterly Groundwater Monitoring and Reports	13
8.6	Annual Air Emission Fee.....	14
8.7	Contingency Set-Aside Funds	14
8.8	Electrical Utility Costs.....	14
8.9	Total Workplan Cost	14

TABLE OF CONTENTS

TABLES

1. Baseline and Quarterly Groundwater Monitoring Regimen
2. Sample Analytical and Quality Control Requirements
3. MPE System Operation and Maintenance Scope and Frequency Schedule 2019
4. MPE System Performance Monitoring Methods and Schedule 2019
5. Summary of Well Data and Sampling Methods

FIGURES

1. Site Location Map
2. Site Map
3. System Layout Map

APPENDIX A – UIC CLASS V General Discharge Permit Application Form

APPENDIX B – Remediation System O&M Data Forms

APPENDIX C – PersulfOx Application Design Summary by Regenesis

APPENDIX D – Cost Detail Forms

TURNER BRANCH AREA REMEDIATION WORKPLAN

INDIAN HILLS COMPLEX STATE HIGHWAY 333 EAST TIJERAS, NEW MEXICO

1.0 BACKGROUND AND OBJECTIVES

A multi-phase extraction (MPE) remediation system was operated at the Turner Branch source area from October 2016 through October 2017. The remediation wellfield consists of three MPE wells (TBMW-27, MPE-1 and MPE-2) and two soil vapor extraction wells (TBMW-5 and SVE-1). The remediation equipment compound contains an SVE blower, air compressor, air stripper and infiltration gallery. Three monitor wells are also located at the site (TBMW-6, TBMW-7 and TBMW-28).

During the year of system operation, groundwater contaminants at the site were substantially reduced. When the system was turned off in October 2017, dissolved contaminant concentrations were below New Mexico Water Quality Control Commission (NMWQCC) standards and/or detection limits in the remediation wells and monitor wells with two exceptions. Naphthalenes at TBMW-5 were detected at 146 micrograms per liter ($\mu\text{g/L}$), exceeding the standard of 30 $\mu\text{g/L}$. Benzene was detected at 9.9 $\mu\text{g/L}$, exceeding the standard of 5.0 $\mu\text{g/L}$. Contaminant rebound has likely occurred in the MPE wells and MW-5 during the 18+ months since the system was turned off.

Depth to shallow unconfined groundwater at Turner Branch is approximately 30 feet bgs. Groundwater occurs in fractured mudstone and siltstone of the Abo Formation. Regional groundwater flow and contaminant migration are predominantly to the west, coincident with topography. Local variations occur due to geologic structure and intermittent stormwater flow in the Tijeras Arroyo which bounds the north side of the site.

The site location is shown on Figure 1. Site features and wells are shown on Figure 2. The remediation system layout is shown on Figure 3.

The scope of this workplan consists of the following tasks:

- Baseline groundwater monitoring event
- Prepare discharge permit application for in-situ chemical oxidation treatment
- Resume operation of MPE system for 1 to 2 quarters with weekly, monthly and quarterly operation and maintenance (O&M) events
- Perform in-situ chemical oxidation by injection of PersulfOx® by Regenesis
- Continued quarterly groundwater monitoring and remedial assessment
- Preparation of associated reports

2.0 BASELINE GROUNDWATER MONITORING EVENT

The most recent groundwater analytical data were obtained in October 2017. Therefore, a site-wide groundwater monitoring event will be performed. All 14 monitor wells and remediation wells at Turner Branch and Canyon Auto will be gauged and sampled to establish current static water levels, groundwater flow direction and contaminant concentrations. Three private water wells will be sampled. The monitoring regimen is summarized in Table 1. Analytical requirements are summarized in Table 2.

2.1 Notifications

Notification of the groundwater monitoring field schedule will be provided to the NMED-PSTB, NMDOT and the following property owners: Estate of Turner Branch, Fred Soll, Not Just Closets and Caroline Pape. Notifications will be provided by email at least 96 hours prior to start of fieldwork.

2.2 Water Level Measurements

Static water levels and total depths will first be gauged in all monitor wells and remediation wells using an electronic interface probe. Measurements will be made relative to the top-of-casing to the nearest 0.01 foot.

2.3 Groundwater Sampling and Analysis

All 14 monitor wells and remediation wells will be purged of a minimum of 5 well volumes or until dry, whichever occurs first, prior to sampling. The 2-inch diameter monitor wells will be purged using new 1.5-inch diameter polyethylene disposable bailers. The 4-inch diameter remediation wells will be purged and sampled using a Grundfos RediFlo2 submersible pump and new $\frac{3}{8}$ -inch diameter disposable poly tubing.

Field parameters of pH, specific conductivity, temperature, dissolved oxygen (DO) and oxidation-reduction potential (ORP) will be recorded at each purged well volume. Groundwater samples will be decanted into 40-milliliter glass vials with mercuric chloride and sodium thiosulfate preservatives. Each vial will be filled to a meniscus, leaving no bubbles or headspace. All samples will be labeled, placed on ice, and delivered to Hall Environmental Analysis Laboratory, Inc. with chain-of-custody records.

2.4 Private Well Sampling and Analysis

Three private water wells that were historically impacted with petroleum contaminants (Fred Soll, Not Just Closets and Caroline Pape) will be purged and sampled during the baseline monitoring event.

The water well at the Fred Soll property does not have a functioning pump. Therefore, this well will be gauged as described in Section 2.2 of this workplan to determine water level, total depth and to calculate purge volume. The well will then be purged and sampled using a Grundfos RediFlo2 submersible pump and new disposable polyethylene tubing as described in Section 2.3 of this workplan.

The water wells at the Not Just Closets property and Caroline Pape property will be purged using their existing dedicated pumps. Both wells will be purged using the hydrants located closest to the wells. Purging will be performed for approximately 10 to 15 minutes prior to sample collection. After purging, the hydrants will be fitted with a ¼-inch diameter sample valve to facilitate low-flow, non-turbulent sample collection.

Private water wells samples will be decanted into 40-milliliter glass vials with mercuric chloride and sodium thiosulfate preservatives. Each vial will be filled to a meniscus, leaving no bubbles or headspace. The samples will be labeled, placed on ice, and delivered to Hall Environmental Analysis Laboratory, Inc. with chain-of-custody records.

All 17 groundwater samples will be analyzed for the following:

- Volatile Organic Compounds (VOCs) + Naphthalenes - EPA Method 8260B
- Ethylene Dibromide (EDB) – EPA Method 504.1

For purposes of the injection discharge permit, the sample from TBMW-5 will also be analyzed for cation/anion balance, alkalinity, total dissolved solids, biological oxygen demand and chemical oxygen demand (Table 2). The baseline monitoring budget also includes costs for post-injection sampling of these parameters.

2.5 Baseline Groundwater Monitoring Report

The baseline groundwater monitoring report will present current contaminant concentrations with respect to NMWQCC standards. The report will include discussion of changes and trends in groundwater elevations and flow direction, dissolved contaminant concentrations, dissolved contaminant distribution, and the degree of contaminant rebound since the remediation system was turned off in October 2017.

Field and laboratory data will be summarized in cumulative tables. Figures and appendices will include a site location map, site maps based on satellite imagery, water table maps, analytical results maps, dissolved contaminant plume maps, and graphs of water levels and dissolved contaminant concentrations versus time, field data forms, hydraulic gradient calculations, sampling protocols and the laboratory reports.

3.0 DISCHARGE PERMIT APPLICATION AND PUBLIC NOTICE

HAI will prepare an application for an Underground Injection Control (UIC) General Discharge Permit in accordance with 20.6.2.5006 NMAC. The application will be prepared using forms issued by the NMED Ground Water Quality Bureau (GWQB) Pollution Prevention Section. The permit application will include the oxidant injection plan and groundwater monitoring plan. The permit application will be submitted with payment of a \$100.00 application fee and a \$600.00 general permit fee.

Four forms of public notice of the permit application will be completed:

- Publish a 3-inch by 4-inch display ad in the local East Mountain newspaper (The Independent)
- Post a 2-foot by 3-foot laminated sign for 30 days in a conspicuous location at the site
- Post an 8.5-inch by 11-inch or larger flyer at the Tijeras public library
- Mail 8.5-inch by 11-inch flyers to the site owner and owners of property within 1/3-mile of the site

The UIC General Discharge Permit application forms are presented in Appendix A.

4.0 REMEDIATION SYSTEM O&M

4.1 Notifications

HAI will provide email notification of the system startup schedule to the PSTB, GWQB and the site owner. Notifications will be provided 1 to 2 weeks prior to system startup.

4.2 Pre-Startup Inspection and Maintenance

The remediation system has not been operated since October 2017. Therefore, HAI will perform a pre-startup inspection and maintenance event. All aboveground components will be visually inspected for damage or degradation that may have occurred since October 2017. All electrical components will be tested for proper operation (blowers, pumps, level switches, lights, receptacles, etc.). HAI will notify PSTB of any damage or equipment issues that cannot be resolved in the field.

HAI will perform oil changes on the air compressor and the SVE blower using the proper manufacturer-specified synthetic oils. All bearings with grease fittings will be greased with AEON blower grease. The SVE blower belts will be checked and adjusted as appropriate. The level switches, water flow meters, and air flow meters will be removed and cleaned. A new bag filter (10-micron or finer) will be installed in the filter vessel. A new intake air filter will be installed on the air compressor. The scale inhibitor vessel will be refilled using the existing supply of scale inhibitor stored in the equipment shed.

Pre-startup inspection, maintenance and equipment testing will require one full day by a technician and staff scientist.

4.3 Regularly Scheduled O&M

Weekly, monthly, and quarterly O&M events will be conducted. HAI assumes the system will be operated for one quarter; however, the workplan budget includes two quarters of system operation. O&M tasks are summarized in Table 3. System performance monitoring methods are summarized in Table 4.

4.3.1 Record System Operating Parameters

The remediation system operation parameters will be recorded in accordance with the frequency indicated in Table 3. The system operation parameters will be recorded on field data forms presented in Appendix B.

4.3.2 Visual Inspection, Cleanup, Site Security, and Identification of Problems

This task includes visual inspection of the remediation system components, general site cleanup, assessment of site security, and identification and recording of issues and/or problems. Issues or problems will be communicated to the Petroleum Storage Tank Bureau (PSTB) Project Manager within 24 hours of discovery.

4.3.3 Equipment Maintenance

This task includes maintenance of the remediation equipment components. Prior to maintenance, the equipment will be de-energized and de-pressurized using manufacturer shut-down procedures; then the manual controls at the control panel will be switched off. Electrical power will be deactivated at the main disconnect panel. After completing maintenance, the equipment will be restarted using manufacturer purge and re-start procedures. Copies of the operational manuals will be maintained at the site and will be available to servicing personnel. Comparable substitutes may be used, with approval of the engineer-of-record. The scope and frequency of maintenance are provided in Table 3.

SVE Module Maintenance

The SVE module includes the SVE manifold, moisture separator and SVE blower/motor.

- Recording of operating parameters.
- Moisture in the SVE moisture separator will be pumped to the air stripper.
- The Sutorbilt SVE blower bearings will be greased using a grease gun and Gardner Denver synthetic grease NLGI # 2 or comparable.
- The Sutorbilt SVE blower lobe lubricant will be changed using Sutorbilt AEON positive displacement blower synthetic oil ISO VG 220 or equivalent. The used lubricant will be collected and recycled off-site at an authorized recycling facility. The new oil will be filled to the specified level and the fill port tightly sealed.
- Rotameters will be cleaned by removing, draining of fluids and particles, and cleaning in Alconox solution and rinsing, on an as-needed basis.
- Blower and motor surfaces will be cleaned with rags to prevent parts overheating.

Groundwater Extraction and Treatment Module Maintenance

The groundwater extraction module includes the Ingersoll-Rand air compressor, pneumatic total fluids pumps, manifold and appurtenances, equalization tank, air stripper, scale inhibitor metering pump and tank, transfer pumps, bag filter vessel and infiltration gallery. The following tasks will be performed to keep the module operational.

- Recording of operating parameters.
- Checking and cleaning of flow meters as needed.
- Cleaning of air stripper trays and sump.
- Checking and cleaning of equalization tank level-sensing switches.
- Checking and cleaning of air stripper level-sensing switches.
- Checking and cleaning of metering pump, tubing and injection point.
- Refilling and ordering of scale inhibitor.
- Prevention of scaling in the air stripper, discharge transfer pump and flow meter and infiltration gallery will be performed by adjusting scale inhibitor injection rate and monitoring scale on the air stripper windows.
- Filtration of air stripper discharge water by replacing bag filters as needed.
- Checking and cleaning of total fluids pumps as needed.

Ingersoll-Rand Air Compressor Maintenance

- Recording of operating parameters.
- Checking of air compressor safety valve by manual activation.
- Checking drive belt tension and adjusting, if necessary.
- Checking air intake filter and cleaning, if necessary. Filter replacement is scheduled to occur quarterly. More frequent replacement will be covered by contingency funding.
- Compressor lubricant will be changed monthly. Synthetic or special blend non-detergent industrial lubricant for reciprocating air compressors with rust and oxidation inhibitors (Speedair IWG 49 or similar) will be used. The used oil will be recycled off-site at an authorized recycling facility.
- The automatic condensation drain will be tested weekly.
- The compressed air moisture separators at the groundwater extraction wells will be drained and blow out weekly.

4.3.4 Gauging of Groundwater and NAPL Levels

This task will be performed to assess fluids extraction regime and capture, NAPL thickness and distribution and general subsurface flow conditions. All Turner Branch site wells including extraction wells will be gauged. Gauging will be conducted using an interface probe with 0.01 foot increments. Clean wells will be gauged first followed by wells containing dissolved contaminants. Wells containing NAPL will be gauged last.

4.3.5 Gauging of Field Vacuum

This task will be performed to assess applied vacuum at the remediation wells and degree and extent of vacuum at the surrounding monitor wells, including the following:

- Measurement of applied vacuum at the MPE wells and SVE wells using wellhead sample ports with hose barb fittings to facilitate vacuum measurements with a portable digital manometer.
- Measurement of vacuum response at the monitor wells using wellhead sample ports with hose barb fittings for vacuum measurements with a portable digital manometer.

4.3.6 PID, Oxygen and LEL Readings at the SVE Manifold and Header

This task will be performed to evaluate organic vapor concentrations, contaminant removal rates, and oxygen concentration to estimate in-situ biodegradation rates. The readings will be collected from each manifold leg and the SVE header along with their respective air flow rates. Organic vapors will be field-tested using a photoionization detector (PID) calibrated to 100 ppm isobutylene span gas. The oxygen meter will be calibrated to atmosphere and 50% lower explosive limit (LEL) methane span gas.

4.3.7 Collection of System Performance Samples

Monthly system performance samples will be collected from the SVE header for analysis of BTEX, TPH-gas and fixed gases. The samples will be collected under vacuum using 1-liter stainless steel Summa canisters provided by the laboratory. The SVE header vapor samples will be shipped by Fedex to Eurofins Air Toxics, Ltd. (Table 2).

4.3.8 Monthly Status Reports

This task includes preparation of monthly O&M status reports. The report will be prepared in a comb-bound letter format and will include the following elements:

- Summary of activities performed
- Tabulated summary of system operating parameters
- Air stripper influent and effluent water analytical laboratory reports
- SVE header vapor analytical laboratory reports
- Calculations of vapor-phase and dissolved-phase contaminant removal rates
- Field forms and notes
- Discussion of system performance and recommendations

NOTE – Quarterly O&M reporting is described in Section 6.0 of this workplan.

5.0 IN-SITU CHEMICAL OXIDATION EVENTS

Based on previous observations, groundwater contaminant concentrations are expected to decline to below standards and/or laboratory detection limits after one quarter of remediation system operation. If this does occur after one quarter, the system will be run for another quarter to substantially reduce the dissolved contaminant concentrations. Decision-making will be based on quarterly groundwater monitoring (Section 6.0) which will be performed concurrent with system operation.

The remediation system will be turned off prior to injection work. No additional wells are required to implement this strategy at Turner Branch.

Regenesis normally prescribes ORC-A (oxygen amendment) for low-level contaminant plumes such as Turner Branch (9.9 µg/L of benzene and 146 µg/L of naphthalenes). However, Regenesis prescribed PersulfOx (chemical oxidation) based on the small size of the plume (≈900 SF). PersulfOx was also prescribed based on the ability to achieve maximum contact between oxidant and contaminant by means of hydraulic control (brief pumping of MPE-2 and TBMW-27) to induce distribution of oxidant through the plume.

Regenesis' responses to PSTB comments and their rationale for specifying a 15% PersulfOx solution are presented in Appendix C.

5.1 PersulfOx Solution Preparation

A total of 6,588 gallons of 15% PersulfOx solution will be mixed using 9,036 pounds of PersulfOx and 6,136 gallons of clean potable water. Potable water for solution mixing will be dispensed from a 4,000-gallon water truck provided by Rodgers Environmental Services, Inc. PersulfOx solution will be batch mixed onsite in an HAI-owned 300-gallon polyethylene water tank. A centrifugal pump will be used to mix and circulate the PersulfOx solution. PersulfOx will be mixed at a ratio of approximately 1.47 pounds of PersulfOx per gallon of potable water (Appendix C).

5.2 PersulfOx Injection Strategy

The 15% PersulfOx chemical oxidant solution will be injected into the shallow aquifer by gravity drainage into extraction well MPE-1. Wells MPE-2 and TBMW-27 will be briefly pumped, only until a slight increase in pH has been confirmed at both wells. Pumping will then cease. The objective is to bias the distribution of PersulfOx solution throughout the groundwater plume that is bounded by MPE-1, MPE-2 and TBMW-27. The most contaminated monitor well TBMW-5 is encompassed by these three extraction wells.

A total of 6,588 gallons of 15% PersulfOx solution will be mixed using 9,036 pounds of PersulfOx and 6,136 gallons of clean potable water. Two injection events will be performed. Both injection events will consist of gravity drainage of 3,294 gallons of 15% PersulfOx solution into well MPE-1. The first injection event will take place 1 to 2 weeks after the remediation system is turned off. The second injection event will be performed 30 to 45 days after the first injection event. Fieldwork to complete the PersulfOx injection events are estimated at 3 days per event. The rate of injection will be limited by the specific capacity of well MPE-1.

The pneumatic total fluids pump will be removed from MPE-1 prior to PersulfOx injection. The pneumatic total fluids pumps will be removed from MPE-2 and TBMW-27 after brief pumping has resulted in confirmed pH increases at both wells.

5.3 PersulfOx Injection Report

HAI will prepare a report summarizing both oxidant injection events. The report will include descriptions of field methods, dates of both injection events, oxidant injection volumes, field observations, field data and any workplan deviations, if applicable. Appendices will include field notes, photographs, PersulfOx purchase and shipping documentation.

The PersulfOx® Application Design Summary prepared by Regenesys is presented in Appendix C.

NOTE – Post-injection analysis of cation/anion balance, alkalinity, total dissolved solids, biological oxygen demand and chemical oxygen demand will be performed on the sample from TBMW-5 in the quarterly monitoring event that occurs after completion of the second injection event.

6.0 QUARTERLY GROUNDWATER MONITORING

Quarterly groundwater monitoring will be performed concurrent with the remediation system O&M and PersulfOx injection events. The first quarter event will be performed after 3 months of system operation. The PersulfOx injection events will be performed during the second quarter. Initial results of the injection events will be determined during the second quarter monitoring event. Longer term effects, and the presence or absence of contaminant rebound, will be evaluated during the third and fourth quarter events.

6.1 Groundwater Monitoring Methodologies

Water level measurements and groundwater sampling will be performed in accordance with methods described in Sections 2.2 through 2.4 of this workplan. The quarterly groundwater monitoring regimen is summarized in Table 1.

6.2 Quarterly O&M and Groundwater Monitoring Reports

This task includes preparation of the quarterly reports summarizing remediation system O&M and quarterly groundwater monitoring. The reports will include the following elements, as applicable:

- Summary of activities performed and sampling protocols
- Results
- Mass removal rates (during system operation)
- Concentration trends and fluid level trends
- Conclusions and recommendations
- Figures:
 - Site map
 - Groundwater elevation map
 - NAPL distribution and thickness map (if applicable)
 - Field vacuum distribution map (during system operation)
 - Distribution of dissolved organic contaminants
- Tables:
 - Groundwater levels
 - Summary of analytical results for groundwater and vapor samples
 - Summary of operating parameters (during system operation)
- Calculations (during system operation):
 - Mass Removal Rates – Groundwater Extraction
 - Mass Removal Rates – Soil Vapor Extraction
 - Mass Destruction Rates – Bioventing
- Appendices:
 - O&M Field Forms
 - Groundwater Sampling Field Forms
 - Analytical Reports

7.0 SEQUENCE OF EVENTS

The conceptual sequence of events will follow a monthly and quarterly schedule dictated by remediation system operation and quarterly groundwater monitoring. The proposed sequence of events is summarized below:

1. Baseline Groundwater Monitoring Event – Fieldwork will be performed 2 to 3 weeks after receipt of workplan approval. The baseline groundwater monitoring report will be submitted approximately 6 weeks after completion of fieldwork.
2. Discharge Permit Application and Public Notice – The permit application will be submitted to GWQB and PSTB approximately 6 weeks after workplan approval. Proof of completion of public notice will be submitted 8 to 10 weeks after workplan approval.
3. Remediation System Pre-Start Inspection and System Startup – Resumption of remediation system operation will begin approximately 6 weeks after workplan approval, assuming no major repairs or equipment replacement is necessary.
4. 1st Quarterly O&M and Groundwater Monitoring Event – This task will be completed approximately 5 months after workplan approval. The 1st quarter report will be submitted approximately 6 weeks after completion of fieldwork.
5. PersulfOx Injection Events – The first injection event will be completed approximately 2 weeks after the 1st quarter O&M and groundwater monitoring fieldwork. The second injection event will be completed approximately 30 to 45 days later. Both injection events will be performed in the 2nd quarter.
6. 2nd Quarterly O&M and Groundwater Monitoring Event – This task will be completed approximately 3 months after the first quarter fieldwork.
7. 3rd Quarter and 4th Quarter Groundwater Monitoring Events – Fieldwork and report submittals will follow the quarterly schedule established by the prior quarterly events.

This conceptual schedule is subject to the following assumptions:

- No major equipment repairs necessary to restart the system
- Timely approval of the discharge permit by the GWQB
- Dissolved contaminant concentrations are reduced to very low levels after one quarter of system operation

8.0 DELIVERABLES AND COSTS

8.1 Baseline Groundwater Monitoring and Report

The baseline groundwater monitoring event and report will be completed for a Fixed Fee of \$16,832.66, including 6.4375% New Mexico Gross Receipts Tax (NMGRT). This includes workplan preparation and is based on sampling all 14 monitor wells and 3 private water wells.

8.2 Discharge Permit Application and Public Notice

Preparation of the discharge permit application and completion of public notice will be completed for a Fixed Fee of \$3,406.00, including NMGRT. Additional fees will consist of the \$100.00 application fee and the \$600.00 general permit fee (both non-taxable).

8.3 Remediation System O&M and Reports

The 1st month system O&M will be completed for a Fixed Fee of \$7,327.37, including NMGRT. The 2nd, 4th and 5th months of system O&M will be completed for a Fixed Fee of \$5,592.44 per month, including NMGRT. This includes weekly O&M, monthly O&M and associated monthly O&M status reports.

8.4 PersulfOx Injection Events and Report

Completion of two PersulfOx injection events and associated report will be completed for a Fixed Fee of \$25,273.58, including NMGRT. This includes 3 days labor for each event, potable water and 2 weeks of water tank rental. The cost of purchase and shipping of 9,036 pounds of Regenesis PersulfOx will be \$29,863.17, including NMGRT.

8.5 Quarterly Groundwater Monitoring and Reports

The 1st quarter O&M, groundwater monitoring and report will be completed for a Fixed Fee of \$13,422.41, including NMGRT. This includes quarterly system O&M labor, performance assessment sampling, groundwater monitoring and preparation of the 1st quarter report.

The 2nd quarter O&M, groundwater monitoring and report will be completed for a Fixed Fee of \$14,695.83, including NMGRT. This includes quarterly system O&M labor, performance assessment sampling, groundwater monitoring and preparation of the 2nd quarter report. **NOTE** – If the remediation system is not operated during the 2nd quarter, HAI will extend a discount of \$4,900.60, including NMGRT, for this deliverable.

The 3rd quarter groundwater monitoring and report will be completed for a Fixed Fee of \$7,617.09, including NMGRT.

The 4th quarter groundwater monitoring and report will be completed for a Fixed Fee of \$12,623.06, including NMGRT.

8.6 Annual Air Emission Fee

HAI will pay the annual air emission fee of \$207.00 (nontaxable) to the City of Albuquerque Air Quality Program. HAI will submit a copy of the check and a copy of the air emission fee invoice to PSTB to substantiate payment of the annual air emission fee.

8.7 Contingency Set-Aside Funds

HAI requests a contingency set aside budget of \$4,000.00, including NMGRT to cover incidental system repairs, parts replacement, or substantial changes in field conditions that may affect costs during the term of this workplan. HAI will submit written requests for release of funds, including description and justification of request for funds. Contingency work will not be performed without prior written authorization from PSTB.

8.8 Electrical Utility Costs

Based on previous system operation, HAI estimates electrical costs of \$500.00 per month, including NMGRT. The remediation system will be operated for at least 3 months with a possibility of up to 6 months. Therefore, the total electrical utility budget for 6 months or two quarters of system operation is \$3,000.00, including NMGRT.

8.9 Total Workplan Cost

The full scope of this workplan will be completed for a Total Cost of \$155,745.49, including 6.4375% NMGRT and non-taxable expenses.

The costs quoted herein will not be exceeded without prior written authorization from the PSTB. This project will be subject to the provisions of Indian Hills Complex Professional Services Contract #18-667-3200-0023 and the PSTB Contractor Fee Schedule effective December 27, 2018.

Cost Detail Forms are presented in Appendix D.

TABLES

**TABLE 1. BASELINE AND QUARTERLY GROUNDWATER MONITORING REGIMEN
INDIAN HILLS COMPLEX, TIJERAS, NEW MEXICO**

Location	Well ID	Gauging Regimen	Sampling Regimen					Analytical Regimen		
		Every Event	Baseline*	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	VOCs EDB	Cations Anions*	Field Parameters
Canyon Auto	CAMW-8	X	X	X	X	X	X	X		X
	CAMW-24	X	X	X	X	X	X	X		X
	CAMW-29	X	X				X	X		X
	CAMW-30	X	X				X	X		X
	CAMW-31B	X	X				X	X		X
	CAMW-32	X	X	X	X	X	X	X		X
Turner Branch	TBMW-5	X	X	X	X	X	X	X	X	X
	TBMW-6	X	X				X	X		X
	TBMW-7	X	X				X	X		X
	TBMW-27	X	X	X	X	X	X	X		X
	TBMW-28	X	X				X	X		X
	MPE-1	X	X	X	X	X	X	X		X
	MPE-2	X	X				X	X		X
	SVE-1	X	X				X	X		X
Private Wells	Fred Soll	X	X		X		X	X		X
	Not Just Closets		X		X		X	X		X
	Caroline Pape		X		X		X	X		X
TOTALS		15	17	6	9	6	17	55	2	55

NOTES:

*Cation/anion balance will be analyzed for MW-5 in baseline event and after 2nd PersulOx injection event

EDB = Ethylene Dibromide by EPA Method 504.1

VOCs = Volatile Organic Compounds + Naphthalenes by EPA 8260B

Field Parameters = pH, temperature, specific conductance, oxidation-reduction potential and dissolved oxygen

X = Scheduled to be sampled and/or gauged

**TABLE 2. SAMPLE ANALYTICAL AND QUALITY CONTROL REQUIREMENTS
INDIAN HILLS COMPLEX, TIJERAS, NEW MEXICO**

Target Analytes	Matrix	Analytical Method	Sample Container	Sample Preparation	Preservative	Holding Time
VOCs TPH-gas	Water	8260B 8015B	3 x 40 mL glass vials	sample vials filled with no bubbles/headspace	Mercuric Chloride	14 Days
EDB	Water	504.1	2 x 40 ml glass vials	sample vials filled with no bubbles/headspace	Sodium Thiosulfate	14 Days
Total Lead	Water	6010	1 x 120 mL poly bottle	fill bottle to shoulder	Nitric Acid	6 Months
Cation/Anion Balance, Alkalinity, Total Dissolved Solids	Water	SM 2320B 300.0 120.1 SM 2540C	1 x 250 mL poly bottle 1 x 250 mL poly bottle 1 x 1L poly bottle 1 x 250 mL poly bottle	fill bottles to shoulder	None Sulfuric Acid None None	48 Hours
BOD COD	Water	SM 5210B 410 Modified	1 x 2L poly bottle 1 x 125 mL poly bottle	fill bottles to shoulder	None	48 Hours
BTEX TPH-gas	Air	EPA TO-3	1 x 1L Summa canister	confirm canister vacuum of >22 inches Hg prior to sampling	None	7 Days
Fixed Gases	Air	ASTM D1945	1 x 1L Summa canister	confirm canister vacuum of >22 inches Hg prior to sampling	None	7 Days

NOTES:

BOD = Biological Oxygen Demand
 COD = Chemical Oxygen Demand
 EDB = Ethylene Dibromide
 TPH-gas = Total Petroleum Hydrocarbons - gasoline range
 VOCs = Volatile Organic Compounds

**Table 3. MPE System Operation and Maintenance Scope and Frequency Schedule 2019
Turner Branch Site, Tijeras, New Mexico**

Task	Task Description	Weekly	Monthly	Quarterly	Number of Events
1	Record system operating parameters	X	X	X	26
2	Visually inspect system, cleanup, assess security	X	X	X	26
3	Identify issues and/or problems to be addressed	X	X	X	26
4	Check air compressor automatic condensation drain	X	X	X	26
5	Drain water from SVE moisture separator	X	X	X	26
6	Check compressor air intake filter, clean as necessary	X	X	X	26
7	Check compressor safety valve	X	X	X	26
8	Check blower and compressor belt tension	X	X	X	26
9	Refill scale inhibitor tank		X	X	6
10	Grease SVE blower and all nonsealed motor bearings		X	X	6
11	Gauge fluid levels in wells		X	X	6
12	Measure well head vacuum		X	X	6
13	Collect PID, LEL and O2 readings at SVE manifold legs and header		X	X	6
14	Clean scale inhibitor metering pump, tubing and injection point		X	X	6
15	Change air compressor oil		X	X	6
16	Collect SVE air samples and air stripper influent/effluent samples		X	X	6
17	Monthly System O&M Status Report		X	X	6
18	Change SVE blower oil			X	2
19	Collect quarterly monitoring and performance assessment samples			X	2
20	Quarterly Monitoring & Performance Report to PSTB, GWQB			X	2
21	Clean air stripper, trays and door				as needed
22	Clean rotameters				as needed
23	Annual air emissions inventory reporting				1

Table 4. MPE System Performance Monitoring Methods and Schedule 2019
Turner Branch Site, Tijeras, New Mexico

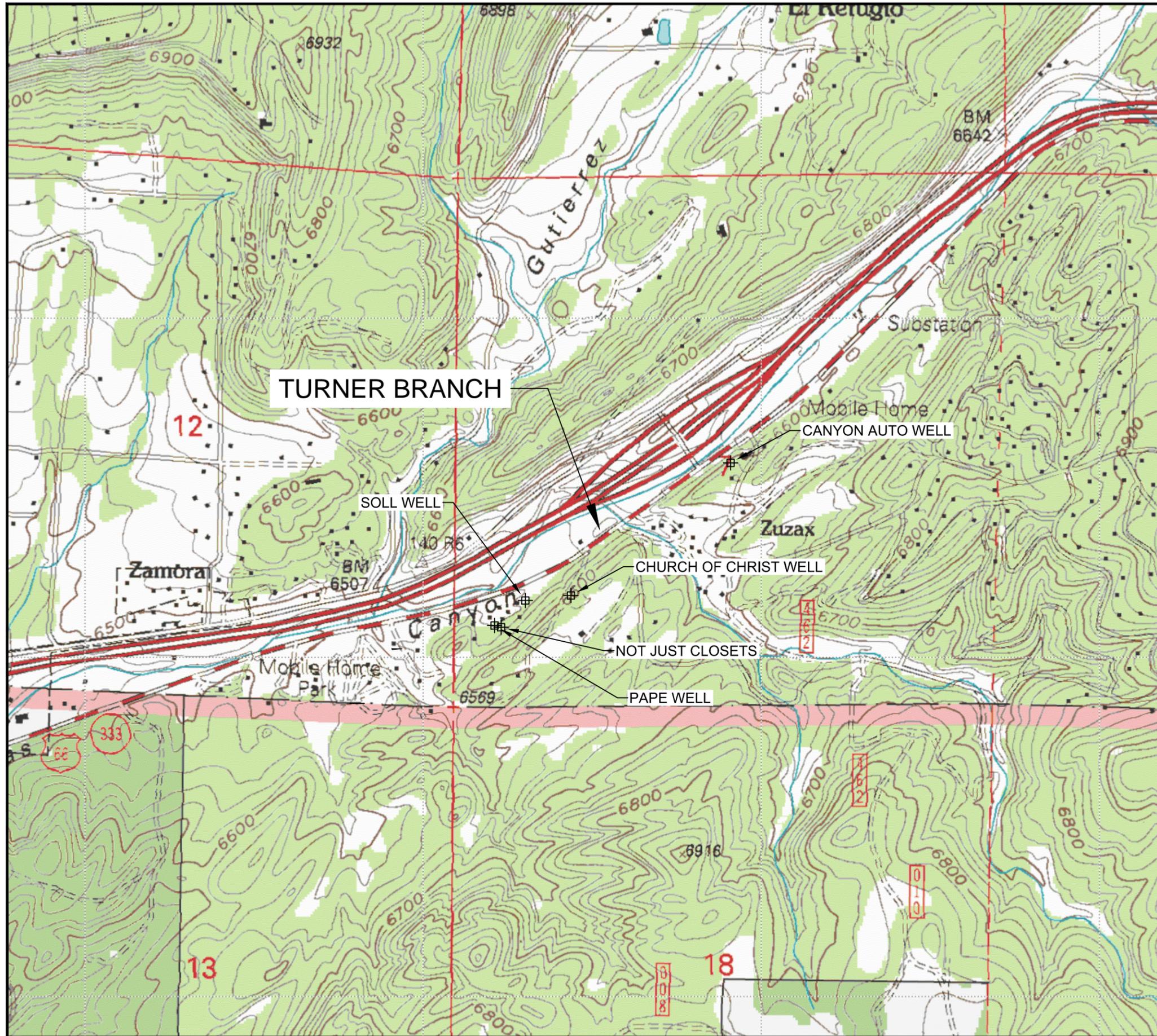
Location	Purpose*	Frequency	Number of Events	Analysis	Media	Sampling Method and Instrumentation	Analytical Method	Sampling Media	Preservation	Hold Time
SVE Header	1, 2	Monthly	6	PID, Oxygen, LEL	Soil Gas	PID, Oxygen Meter, and Peristaltic Pump	NA	Tedlar Bag	NA	NA
SVE Header	1, 2	Monthly	6	BTEX, TPH-gas	Soil Gas	1 Liter Summa Canister, Vacuum Gauge	EPA TO-3	1L Summa Canister	NA	7 days
SVE Header	1, 2	Quarterly	2	Fixed Gases	Soil Gas	1 Liter Summa Canister, Vacuum Gauge	ASTM D1945	1L Summa Canister	NA	7 days
SVE Manifold Legs	1, 2	Monthly	6	PID, Oxygen, LEL	Soil Gas	PID, Oxygen Meter, and Peristaltic Pump	NA	Tedlar Bag	NA	NA
Soil Vapor Extraction Rate	1, 2, 3	Weekly	26	Flow Rate	Soil Gas	Air Rotameter	NA	NA	NA	NA
Soil Vapor Extraction Vacuum	7	Weekly	26	Vacuum	Soil Gas	Vacuum Gauge	NA	NA	NA	NA
Groundwater Extraction Rate	4	Weekly	26	Flow Rate	Aqueous	Flow Meter	NA	NA	NA	NA
Air Stripper Influent	1, 2, 3	Monthly	6	TPH-gas	Aqueous	Sampling Port, Direct Collection	EPA 8015B	2 x 40 mL	HgCl ₂	14 days
Air Stripper Influent	1, 2, 3	Monthly	6	VOCs, EDB	Aqueous	Sampling Port, Direct Collection	EPA 8260B, 504.1	3 x 40 mL	HgCl ₂ , Na ₂ S ₂ O ₃	14 days
Air Stripper Effluent	1, 2, 3	Monthly	6	VOCs, EDB	Aqueous	Sampling Port, Direct Collection	EPA 8260B, 504.1	5 x 40 mL	HgCl ₂ , Na ₂ S ₂ O ₃	14 days
Air Stripper Effluent	1, 2, 3	Monthly	6	Total Lead	Aqueous	Sampling Port, Direct Collection	EPA 6010	1 x 500 mL Poly	HNO ₃	6 months
Air Stripper Pressure	4, 6	Weekly	26	Pressure	Air	Portable Digital Manometer	NA	NA	NA	NA
Air Stripper Transfer Pump	4, 6	Weekly	26	Flow Rate	Aqueous	Flow Meter	NA	NA	NA	NA
Bag Filter Vessel	5	Weekly	26	Pressure	Aqueous	Pressure Gauge	NA	NA	NA	NA
Fluid Levels in All 8 Wells	7	Monthly	6	Fluid Levels	Aqueous, NAPL	Interface Probe	NA	NA	NA	NA
Well Head Vacuum in All 8 wells	7	Monthly	6	Vacuum	Soil	Portable Digital Manometer	NA	NA	NA	NA

*Purpose Index
1 - Mass Removal Rates
2 - Concentration Trends
3 - Treatment Efficiency
4 - Processing Rate
5 - Maintenance Indicator
6 - Hydraulic Regime
7 - Vacuum Regime

**TABLE 5. SUMMARY OF WELL DATA AND SAMPLING METHODS
INDIAN HILLS COMPLEX**

<u>CANYON AUTO (6 Wells)</u>	<u>DIAMETER (inches)</u>	<u>SAMPLE METHOD</u>
CAMW-8	2	bailer
CAMW-24	4	RediFlo2 pump+tubing
CAMW-29	4	RediFlo2 pump+tubing
CAMW-30	2	bailer
CAMW-31B	4	RediFlo2 pump+tubing
CAMW-32	4	RediFlo2 pump+tubing
<u>TURNER BRANCH (8 Wells)</u>		
TBMW-5	2	bailer
TBMW-6	2	bailer
TBMW-7	2	bailer
TBMW-27	4	RediFlo2 pump+tubing
TBMW-28	2	bailer
MPE-1	4	RediFlo2 pump+tubing
MPE-2	4	RediFlo2 pump+tubing
SVE-1	2	bailer
<u>PRIVATE WELLS (3)</u>		
Fred Soll		RediFlo2 pump+tubing
Not Just Closets		dedicated pump
Caroline Pape		dedicated pump
TOTAL SAMPLED BY BAILER		
	7	
TOTAL SAMPLED BY REDIFLO2		
	8	
TOTAL BY DEDICATED PUMP		
	2	
TOTAL WELLS		
	17	

FIGURES



NOTES:

⊞ PRIVATE WATER SUPPLY WELLS

SURFACE WATER RECEPTORS INCLUDED THE TIJERAS ARROYO THAT IS LOCATED TO THE NORTH OF THE SITE.

REV.	DATE	DRAWN	CHECKED	REMARKS

Haller & Associates, Inc.
Environmental Services & Geoscience

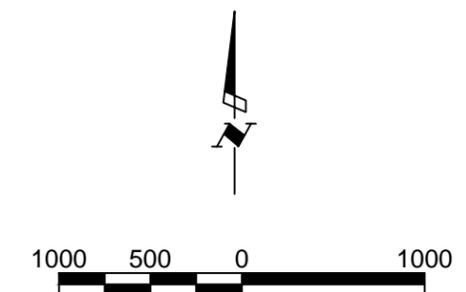
DESIGNED BY: _____
DRAWN BY: _____
CHECKED BY: _____

INDIAN HILLS COMPLEX
HIGHWAY 333, TIJERAS, NEW MEXICO

SITE LOCATION MAP

PROJECT NUMBER:
6230804

DRAWING NO.:
FIGURE 1

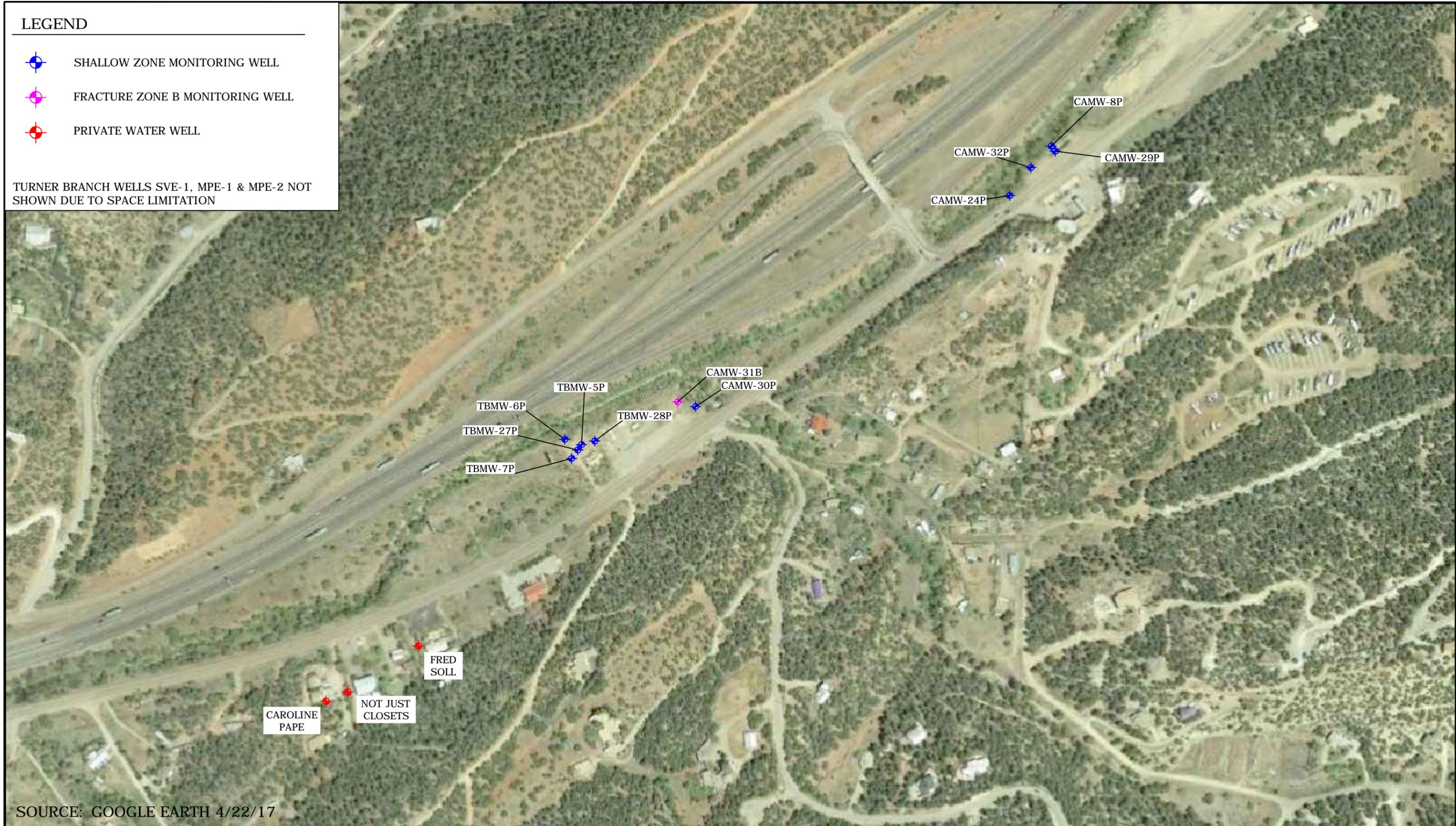


REVISIONS

LEGEND

-  SHALLOW ZONE MONITORING WELL
-  FRACTURE ZONE B MONITORING WELL
-  PRIVATE WATER WELL

TURNER BRANCH WELLS SVE-1, MPE-1 & MPE-2 NOT SHOWN DUE TO SPACE LIMITATION



SOURCE: GOOGLE EARTH 4/22/17



P.O. BOX 1667, 12220 N. HWY 14, SUITE C
CEDAR CREST, NEW MEXICO 87008

SITE MAP

INDIAN HILLS COMPLEX
HIGHWAY 333
TIJERAS, NEW MEXICO



FIGURE

2

LEGEND

- MONITORING WELL
- CONVEYANCE LINES



SOURCE: GOOGLE EARTH 4/22/17

Haller & Associates, Inc.
Environmental Services & Geoscience
P.O. BOX 1667, 12220 N. HWY 14, SUITE C
CEDAR CREST, NEW MEXICO 87008

TURNER BRANCH SYSTEM LAYOUT MAP

INDIAN HILLS COMPLEX
HIGHWAY 333
TIJERAS, NEW MEXICO



FIGURE
3



WELL LOG: MPE-1

COMPLETION DATE: JULY 10, 2015

TOTAL WELL DEPTH: 70 FT BGS

PROJECT INFORMATION

CONSTRUCTION DETAILS

LOCATION: TURNER BRANCH SITE
 ADDRESS: HIGHWAY 333, TIJERAS, NEW MEXICO
 GEOLOGIST: TIMOTHY M. HALLER, CPG
 DRILLER: GLEN SANDERS - GEOMECHANICS SW
 DRILL METHOD: 7-1/4" TRICONE AIR ROTARY
 SAMPLE TYPE: CUTTINGS

CASING ELEVATION: 6560.96 FT MSL
 SCREEN INTERVAL: 30-70 FT BGS
 BENTONITE INTERVAL: 23-26 FT BGS
 SANDPACK INTERVAL: 26-72 FT BGS
 CASING TYPE: 4" ID SCH 40 PVC
 SCREEN SIZE: 0.030-INCH SLOTS

NOTES: MPE-1 DRILLED NORTH OF TBMW-5

DEPTH (FEET)	INTERVAL	SAMPLE ID	PID (PPM-V)	LITHOLOGIC DESCRIPTION	GRAPHIC LOG	WELL DIAGRAM	DEPTH (FEET)
0				FILL - REDDISH BROWN CLAYEY SANDY SILT (ML); loose, dry, very fine grained fill with cobbles and boulders, no staining or odor.			0
5			0.0				5
10			0.0	MAROON AND DARK BROWN MUDSTONE; soft to medium dense, dry, dark gray mottling, minor thin siltstone stringers, no odor.			10
15			0.0				15
20			0.0				20
25			0.2				25
30			0.4	LIGHT MAROON MUDSTONE; soft, dry but starting to produce water at 41 feet, light blue gray mottling, slight petroleum odor from return air.			30
35			1.2				35
40			2.6				40
45			1.9	DARK REDDISH BROWN MUDSTONE; harder than above, with hard dark gray calcareous nodules up to 1/2 inch diameter, boring producing approximately 1 gpm, slight petroleum odor from return air.			45
50			0.4				50
55			0.2				55
60			0.2				60
65			0.2	DARK REDDISH BROWN SILTSTONE AND MUDSTONE; hard, slower drilling than above, fissile, dark blue-gray mottling, petroleum odor from in return air, PID vapors 15-20 ppm inside boring.			65
70			0.1				70
75				STAINLESS STEEL CENTRALIZERS AT 40 FT AND 60 FT			75

APPENDIX A

**UIC CLASS V GENERAL DISCHARGE PERMIT
APPLICATION FORM**



NEW MEXICO ENVIRONMENT DEPARTMENT
GROUND WATER QUALITY BUREAU
UNDERGROUND INJECTION CONTROL
GENERAL DISCHARGE PERMIT



Certified Mail- Return Receipt Requested

Facility Name: [FACILITY NAME]
Facility Location: Physical Address
Section, Township, Range
County

Legally Responsible Party: [LEGALLY RESPONSIBLE PARTY]
Physical Address
Phone Number

Remediation Oversight Agency Contact: [NAME OF NMED BUREAU OR SECTION]
Contact Name
Phone Number

Remediation or Injection Plan Identification: [INJECTION PLAN IDENTIFICATION]

Permitting Action: New/Renewal/Modification/Renewal and Modification

PPS Contact Contact Name
Phone Number

EFFECTIVE DATE: XX/XX/XXX **TERM ENDS: XX/XX/XXXX**

Michelle Hunter
Chief, Ground Water Quality Bureau

[Subsection H of 20.6.2.3109 NMAC, NMSA 1978, § 74-6-5.I]

Version updated December 5, 2018

I. UIC GENERAL DISCHARGE PERMIT

The New Mexico Environment Department (NMED) Ground Water Quality Bureau (GWQB) issues this Underground Injection Control General Discharge Permit (UIC Permit) for the subsurface emplacement of additive fluids through a Class V UIC injection well for the purpose of facilitating vadose zone or groundwater remediation. The GWQB issues this UIC Permit to [LEGALLY RESPONSIBLE PARTY] (Permittee) pursuant to the New Mexico Water Quality Act (WQA), NMSA 1978 §§74-6-1 through 74-6-17, and the New Mexico Water Quality Control Commission (WQCC) Ground and Surface Water Protection Regulations, 20.6.2 NMAC.

In issuing this UIC Permit, the GWQB has determined that the requirements of Subsection C of 20.6.2.3109 NMAC have been met. The activities authorized by this UIC Permit are principally governed by [INJECTION PLAN IDENTIFICATION] (Injection Plan), under the authority of [STATUTES/REGULATIONS], with oversight by the [NAME OF NMED BUREAU OR SECTION]. Compliance with this UIC Permit requires compliance with the terms, requirements, and conditions of the Injection Plan. The term of this UIC Permit shall be no longer than five years from the effective date of this UIC Permit.

The injection activities, the location of the injection site, the type of injection and quantities of additives being used are briefly described as follows:

Injection Activities (summary: including injection well type, number of wells, and injection frequency)

Copy of the Injection Plan Attached (required):

Injection Site Information

Depth to groundwater: XXX ft

Existing concentration of total dissolved solids (TDS) in groundwater: X,XXX mg/L

Location: Description of site location

County: County

Latitude: Latitude

Longitude: Longitude

Map Showing Area of Injection Sites Attached (required) -:

Additives Being Used (including volumes, manufacturer, and mixing ratios)

Anticipated Precipitation, Dissolution, Adsorption, and Desorption Products

Public Notice Posting Locations

2 inch by 3 inch Newspaper Ad required for Renewal applications.

Newspaper: [Selected Newspaper](#)

3 inch by 4 inch Newspaper Ad required for New, Modification, and Renewal/Modification applications.

Newspaper: [Selected Newspaper](#)

2 feet by 3 feet sign posted for 30 days in a location conspicuous to the public at or near the facility required for New, Modification, and Renewal/Modification applications.

Sign Location: [Selected Location](#)

8.5 inch by 11 inch or larger posted off-site location conspicuous to the public (e.g. public library). Required for New, Modification, and Renewal/Modification applications.

Flyer Location: [Selected Location](#)

This UIC Permit consists of the complete and accurate completion of this UIC Permit form as determined by the GWQB.

Issuance of this UIC Permit does not relieve the Permittee of the responsibility to comply with the WQA, WQCC Regulations, and any other applicable federal, state and/or local laws and regulations, such as zoning requirements and nuisance ordinances.

Signatures

Signature must be that of the person listed as the legally responsible party on this application.

I, the applicant, attest under penalty of law to the truth of the information and supporting documentation contained in this application for an Underground Injection Control General Discharge Permit.

Applicant's Signature

Signature:

Date:

Facility Name, DP-#

Effective Date: _____

Printed Name:

Title:

II. FINDINGS

In issuing this UIC Permit, GWQB finds:

1. The Permittee is injecting fluids so that such injections will move directly or indirectly into groundwater within the meaning of Section 20.6.2.3104 NMAC.
2. The Permittee is injecting fluids so that such fluids will move into groundwater of the State of New Mexico which has an existing concentration of 10,000 mg/L or less of TDS within the meaning of Subsection A of 20.6.2.3101 NMAC.
3. The Permittee is using a Class V UIC well as described in 20.6.2.5002(B)(5)(d)(ii) NMAC for in situ groundwater remediation by injecting a fluid that facilitates vadose zone or groundwater remediation.
4. The Permittee is injecting fluids into groundwater in order to achieve the remediation goals identified in the Injection Plan.

III. AUTHORIZATION TO DISCHARGE

The Permittee is authorized to inject chemical additives into groundwater in accordance with this UIC Permit and the Injection Plan under the oversight of **[NAME OF NMED BUREAU OR SECTION]**.

[20.6.2.3104 NMAC, Subsection C of 20.6.2.3106 NMAC, Subsection C of 20.6.2.3109 NMAC]

IV. CONDITIONS

The conditions of this UIC Permit shall be complied with by the Permittee and are enforceable by GWQB.

1. The Permittee shall perform remediation activities in accordance with the Injection Plan and shall notify GWQB of any changes prior to making them.

[20.6.2.3107 NMAC]

2. The Permittee shall monitor the injection activities and their effects on groundwater quality as required by the Injection Plan and shall provide GWQB with electronic copies of the required reporting and any pertinent documentation of activities at the site.

[20.6.2.3107.A NMAC, 20.6.2.3109.A NMAC]

3. If the GWQB or the Permittee identifies any failure of the Injection Plan or this UIC Permit to comply with 20.6.2 NMAC not specifically noted herein, GWQB may require the Permittee to submit a corrective action plan and a schedule for completion of corrective actions to address the failure.

Additionally, the GWQB may require the Permittee to submit a proposed modification to the Injection Plan, this UIC Permit, or both.

[20.6.2.3107.A NMAC, 20.6.2.3109.E NMAC]

4. **ADDITIONAL MONITORING REQUIREMENTS – (RESERVED) - Placeholder for any added monitoring and reporting requirements.**
5. **TERMINATION** – Within 30 days of completion of activities authorized by this UIC Permit the Permittee shall submit a closure report and a request to terminate the UIC Permit to the GWQB for its approval. The closure report shall identify how the injection well(s) was (were) closed in accordance with the Injection Plan. The Permittee shall provide **[NAME OF NMED BUREAU OR SECTION]** with a copy of this closure report.

[20.6.2.5005 NMAC, 19.27.4 NMAC]

6. **INSPECTION and ENTRY** – The Permittee shall allow a representative of the NMED to inspect the facility and its operations subject to this UIC Permit and the WQCC regulations. The GWQB representative may, upon presentation of proper credentials, enter at reasonable times upon or through any premises in which a water contaminant source is located or in which are located any records required to be maintained by regulations of the federal government or the WQCC.

The Permittee shall allow the GWQB representative to have access to, and reproduce for their use, any copy of the records, and to perform assessments, sampling or monitoring during an inspection for the purpose of evaluating compliance with this UIC Permit and the WQCC regulations.

Nothing in this UIC Permit shall be construed as limiting in any way the inspection and entry authority of GWQB under the WQA, the WQCC Regulations, or any other local, state, or federal regulations.

[20.6.2.3107.D NMAC, NMSA 1978, §§ 74-6-9.B and 74-6-9.E]

7. **MODIFICATIONS and/or AMENDMENTS** – In the event the Permittee proposes a change to the injection plan that would result in a change in the volume injected; the location of the injections; or the concentration of the additives being injected by the facility, the Permittee shall

notify GWQB prior to implementing such changes. The Permittee shall obtain approval (which may require modification of this UIC Permit) by GWQB prior to implementing such changes.

[20.6.2.3107.C NMAC, 20.6.2.3109.E and G NMAC]

8. COMPLIANCE with OTHER LAWS – Nothing in this UIC Permit shall be construed in any way as relieving the Permittee of the obligation to comply with all applicable federal, state, and local laws, regulations, permits, or orders.

[NMSA 1978, § 74-6-5.L]

9. PERMIT FEES – Payment of permit fees is due at the time of UIC Permit approval. Permit fees shall be paid in a single payment remitted to GWQB no later than 30 days after the UIC Permit effective date.

Permit fees are associated with issuance of this UIC Permit. Nothing in this UIC Permit shall be construed as relieving the Permittee of the obligation to pay all permit fees assessed by GWQB. A Permittee that ceases injecting or does not commence injecting during the term of the UIC Permit shall pay all permit fees assessed by GWQB. An approved UIC Permit shall be suspended or terminated if the facility fails to remit a payment by its due date.

[20.6.2.3114.F NMAC, NMSA 1978, § 74-6-5.K]

APPENDIX B

REMEDIATION SYSTEM O&M DATA FORMS

TURNER BRANCH SITE - TIJERAS, NEW MEXICO
SYSTEM OPERATING PARAMETERS

Date and Time of Arrival:		Weekly Monthly Quarterly	
Field Technician(s):		System Running Upon Arrival? YES NO	
Component	Value	Units	Comments / Details
Air Stripper Hour Meter		hr	
Air Compressor Hour Meter		hr	
Air Compressor Supply Pressure		psi	
Air Stripper Pressure		in w.c.	
Scale Inhibitor Pump Speed		%gal/day	
Scale Inhibitor Tank Volume		gal	
Moisture Separator Water Volume		gal	
Bag Filter Pressure		psi	
Pressure Regulators Drained?	YES	NO	
Bag Filter Replaced?	YES	NO	
SVE Blower Belt Tension Checked?	YES	NO	
SVE Blower Bearings Greased?	YES	NO	
EQ Tank Levels Switches Cleaned?	YES	NO	
Air Stripper Level Switches Cleaned?	YES	NO	
Fence and Gates Secure?	YES	NO	
Any Leaks, Excessive Noise, Vibration?	YES	NO	
Supplies or Parts Needed? (specify)	YES	NO	
Other (explain)			
NOTES			
<hr style="border-top: 1px dotted black;"/> <hr style="border-top: 1px dotted black;"/>			

**TURNER BRANCH SITE - TIJERAS, NEW MEXICO
REMEDATION WELL AND OBSERVATION WELL DATA**

Date: _____ Weekly Monthly Quarterly
(circle one)

Field Technician(s): _____

SOIL VAPOR EXTRACTION PARAMETERS

Well ID / Location	Valve Status	Flowrate scfm	Wellhead Vacuum in wc	PID ppmv	Oxygen %	LEL %	Comments / Details
MPE-1							
MPE-2							
SVE-1							
TBMW-5							
TBMW-6							
TBMW-7							
TBMW-27							
TBMW-28							
SVE Header							SVE Header Temperature °F = _____

GROUNDWATER EXTRACTION PARAMETERS

Well ID / Location	Totalizer Reading gal	Flow Rate gpm	DTP ft	DTW ft	Comments / Details
MPE-1					
MPE-2					
TBMW-27					
TBMW-5					
TBMW-6					
TBMW-7					
TBMW-28					
SVE-1					
AS Discharge					

NOTES
.....

**INDIAN HILLS COMPLEX, TIJERAS, NEW MEXICO
MONITOR WELL GAUGING DATA**

Date: _____					
Monthly Quarterly (circle one)					
Field Technician(s): _____					
Well ID	DTP ft	DTW ft	TD ft	Time	Comments
MPE-1					
MPE-2					
SVE-1					
TBMW-5					
TBMW-6					
TBMW-7					
TBMW-27					
TBMW-28					
CAMW-8					
CAMW-24					
CAMW-29					
CAMW-30					
CAMW-31B					
CAMW-32					
Fred Soll					
GAUGING SCHEDULE: Monthly - TB Wells Quarterly - All Wells					
NOTES					
.....					
.....					

APPENDIX C

**PERSULFOX APPLICATION DESIGN SUMMARY
BY REGENESIS**



PersulfOx® Application Design Summary		
Turner Branch - Proposal No. BRG60698		
Dissolved Plume		Field App. Instructions
Application Method	Well	Product Cost \$23,494.64 plus shipping and sales tax.
Spacing Within Rows (ft)	n/a	
Spacing Between Rows (ft)	n/a	
Injection Points (per app.)	1	
Number of Applications	2	
Areal Extent (square ft)	900	Field Mixing Ratios
Top Application Depth (ft bgs)	30	Water per Pt per app (gals)
Bottom Application Depth (ft bgs)	60	3068
PersulfOx to be Applied (lbs)	9,036.4	PersulfOx per Pt per app (lbs)
PersulfOx Solution %	15%	4518
Volume Water (gals)	6,136	Total Volume per Pt per app (gals)
Total Volume (gals)	6,588	3294
<i>Per Application Totals</i>		
<i>PersulfOx per app. (lbs)</i>	<i>4,518</i>	<i>Volume per vertical ft (gals)</i>
<i>Volume Water per app. (gals)</i>	<i>3,068</i>	<i>110</i>
<i>Total Volume per app. (gals)</i>	<i>3,294</i>	
Technical Notes/Discussion		
<p>Per our conversation the product will be applied to MPE-1. Use TBMW-27 and MPE-2 as extraction wells to help distribute the PersulfOx. Use and elevated pH as your indicator to stop pulling from the two wells.</p>		
Assumptions/Qualifications		
<p>In generating this preliminary estimate, Regenesis relied upon professional judgment and site specific information provided by others. Using this information as input, we performed calculations based upon known chemical and geologic relationships to generate an estimate of the mass of product and subsurface placement required to affect remediation of the site.</p>		
<p>REGENESIS developed this Scope of Work in reliance upon the data and professional judgments provided by those whom completed the earlier environmental site assessment(s). The fees and charges associated with the Scope of Work were generated through REGENESIS' proprietary formulas and thus may not conform to billing guidelines, constraints or other limits on fees. REGENESIS does not seek reimbursement directly from any government agency or any governmental reimbursement fund (the "Government"). In any circumstance where REGENESIS may serve as a supplier or subcontractor to an entity which seeks reimbursement from the Government for all or part of the services performed or products provided by REGENESIS, it is the sole responsibility of the entity seeking reimbursement to ensure the Scope of Work and associated charges are in compliance with and acceptable to the Government prior to submission. When serving as a supplier or subcontractor to an entity which seeks reimbursement from the Government, REGENESIS does not knowingly present or cause to be presented any claim for payment to the Government.</p>		



1011 Calle Sombra
San Clemente, CA 92673
US

PRICE QUOTATION

(valid for only 30 days from date of quote)

Contact Name	Tim Haller	Account Name	Haller & Associates
Created Date	2/14/2019	Prepared By	Shannon Suangka
Quote Name	Indian Hills		

Thank you for your interest in RegenesiS Products. Please find below the sales price and related shipping, handling and tax costs per your request.

Please note that a Price Quotation is not a sales order. To place an order please contact our customer service department at 949 366-8000 or order online at <http://www.regenesiS.com/order>.

Products

Product Code	Product	Quantity	Sales Price	Total Price
2000	Persulfox Bag (55.1 lb)	9,036.40	USD 2.60	USD 23,494.64

Special Delivery	Fedex priority 3 business days	Subtotal	USD 23,494.64
Instructions	Lift gate and pallet jack at delivery	Tax	USD 1,437.89
		Estimated Shipping/Freight	USD 4,311.84
		Handling Fees	USD 250.00
		Grand Total	USD 29,494.37

Payment Terms	Net 30	Ship From	Chino, CA
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PAYMENT TERMS: Accounts outstanding after the listed payment terms will be assessed 1.5% monthly interest.

Volume discount pricing will be rescinded on all accounts outstanding over 90 days. An early payment discount of 1.5% Net 10 is available on cash or check payment only.

RETURN POLICY: All requests to return product must be pre-approved by RegenesiS. A 15% re-stocking fee will be charged for all returned goods. Return freight must be prepaid and product must be in saleable condition. No product will be accepted for return after of 90 days from original delivery date.

SHIPPING POLICY: the following terms and conditions shall apply

- As a service RegenesiS will assist and coordinate with independent trucking brokers/carriers the delivery of product. RegenesiS will also coordinate a "will call" pick up at one of its warehouse locations with a customer's freight carrier of choice. Please note that product availability will vary by warehouse location.
- All quoted rates and delivery dates are based on Standard Delivery Terms, which allow or provide only an estimated date and time of delivery of product to a site. Delivery times will vary per carrier. A Guaranteed Delivery can be arranged for an additional cost, and must be place 7 days prior to shipment. Under a Guarantee Delivery, if the product is not delivered per the specified date and time, the carrier will refund some amount up to the full transportation costs associated with the shipment.
- Shipping /Freight costs are estimates and may change pending requirement of any additional equipment or change in volume or delivery instructions at time of placing order.

SHIPPING DISCLAIMER: RegenesiS is not in the business of shipping or transportation of its products. We will strive to assist in meeting shipping requirements, but please realize that all shipments are subject to carriers availability, weather, mechanical problems, or other unforeseen circumstances. As a result RegenesiS can not be held responsible for project/site costs incurred due to shipping related problems. Sales Tax: Sales tax charges are estimated on the quote/ sales confirmations based on delivery location. The actual sales tax rate is



Technology-Based Solutions for the Environment

1011 Calle Sombra
San Clemente, CA 92673
US

calculated at time of invoice. Variations due to, but not limited to county and or local sales tax rates.

Sales Tax: Sales tax charges are estimated on the quote/ sales confirmations based on delivery location. The actual sales tax rate is calculated at time of invoice. Variations due to, but not limited to county and or local sales tax rates.

Resale /Tax Exempt Certificate: A Re-Sales Certificate or Tax Exempt Certificate must be presented to the customer service department at the time an order is placed.

Handling Fee: Handling Fees may be subject to sales tax based on point of delivery.

Freight: Freight charges are estimates and actual freight charges are calculated at the time of invoice. Additional freight charges may be assessed for any accessorial requested at the time of delivery. Please communicate any requirements for delivery with the customer service department at the time the order is placed. Standard delivery is between 8am -5pm Monday –Friday. *accessorial – can include, but not limited to lift gate and pallet jack at delivery, inside delivery, time definite deliveries, and delivery appointments.

APPENDIX D

COST DETAIL FORMS

**NM CORRECTIVE ACTION FUND COST DETAIL FORM
SUMMARY SHEET**

Site: Indian Hills Complex - Turner Branch Site	Site Address: 811 E. Highway 333 (I-40 Zuzax Exit) Tijeras, NM 87059
---	---

Check one only: <input checked="" type="checkbox"/> Work Plan <input type="checkbox"/> Claim	Check one only: <input type="checkbox"/> Minimum Site Assessment <input type="checkbox"/> Ph 1 Hydrogeo Investigation <input type="checkbox"/> Ph 2 Free Product/Saturated Soil Recovery	 <input type="checkbox"/> Ph 3 Reclamation Proposal <input type="checkbox"/> Ph 4 Reclamation Implementation <input checked="" type="checkbox"/> Ph 5 Operations and Maintenance
---	--	--

Del ID(s): All	Brief description of deliverable: Baseline GWM, System O&M, Quarterly GWM, PersulfOx Injection, Reports	NMED USE ONLY
--------------------------	---	----------------------

SUMMARY SHEET		TOTAL	PROJECT MANAGER	AUDITOR
PROFESSIONAL SERVICES		\$110,840.00		
TAXABLE EXPENSES		\$31,815.07		
TAXABLE SUBCONTRACTORS		\$0.00		
TAXABLE SUBTOTAL		\$142,655.07		
NM GRT RATE:	6.4375%	\$9,183.42		
TOTAL		\$151,838.49		
NONTAXABLE EXPENSES		\$3,907.00		
NONTAXABLE SUBCONTRACTORS		\$0.00		
NONTAXABLE SUBTOTAL		\$3,907.00		
GRAND TOTAL OF CLAIM		\$155,745.49		

**NM CORRECTIVE ACTION FUND COST DETAIL FORM
PROFESSIONAL SERVICES**

Site: Indian Hills Complex - Turner Branch Site	Site Address: 811 E. Highway 333 (I-40 Zuzax Exit) Tijeras, NM 87059
---	---

Check one only: <input checked="" type="checkbox"/> Work Plan <input type="checkbox"/> Claim	Check one only: <input type="checkbox"/> Minimum Site Assessment <input type="checkbox"/> Ph 1 Hydrogeo Investigation <input type="checkbox"/> Ph 2 Free Product/Saturated Soil Recovery <input type="checkbox"/> Ph 3 Reclamation Proposal <input type="checkbox"/> Ph 4 Reclamation Implementation <input checked="" type="checkbox"/> Ph 5 Operations and Maintenance
---	--

Del ID(s):	Brief description of deliverable:
All	Baseline GWM, System O&M, Quarterly GWM, PersulfOx Injection, Reports

PROFESSIONAL SERVICES	INVOICE #	RATE	UNIT	#OF UNITS	TOTAL	PROJECT MANAGER	AUDITOR
Baseline GWM and Report	NA	15,814.60	Month	1	\$15,814.60		
1st Month O&M and Report	NA	6,884	Month	1	\$6,884.20		
2nd, 4th, 5th Monthly O&M and Reports	NA	5,254.20	Month	3	\$15,762.60		
1st Quarter O&M, Monitoring & Report	NA	12,610.60	Quarter	1	\$12,610.60		
2nd Quarter O&M, Monitoring & Report	NA	13,807.00	Quarter	1	\$13,807.00		
DP Application and Public Notice	NA	3,200.00	LS	1	\$3,200.00		
2 Persulfox Injection Events and Report	NA	23,745.00	LS	1	\$23,745.00		
3rd Quarter GWM and Report	NA	7,156.40	Quarter	1	\$7,156.40		
4th Quarter GWM and Report	NA	11,859.60	Quarter	1	\$11,859.60		
Discount if remediation system is not operated in the 2nd Quarter	NA	-4,604.20	LS	1			
SUBTOTAL					\$110,840.00		

**NM CORRECTIVE ACTION FUND COST DETAIL FORM
EXPENSES**

Site: Indian Hills Complex - Turner Branch Site	Site Address: 811 E. Highway 333 (I-40 Zuzax Exit) Tijeras, NM 87059
---	---

Check one only: <input checked="" type="checkbox"/> Work Plan <input type="checkbox"/> Claim	Check one only: <input type="checkbox"/> Minimum Site Assessment <input type="checkbox"/> Ph 1 Hydrogeo Investigation <input type="checkbox"/> Ph 2 Free Product/Saturated Soil Recovery <input type="checkbox"/> Ph 3 Reclamation Proposal <input type="checkbox"/> Ph 4 Reclamation Implementation <input checked="" type="checkbox"/> Ph 5 Operations and Maintenance
---	--

Del ID(s):	Brief description of deliverable:	NMED USE ONLY
	Electrical Utilities, Permit Fees, PersulfOx Purchase and Shipping	

EXPENSES	INVOICE #	RATE	UNIT	#OF UNITS	TOTAL	PROJECT MANAGER	AUDITOR
<u>NONTAXABLE</u>							
Monthly Electric	NA	\$500.00	Month	6	\$3,000.00		
Discharge Permit Application Fee	NA	\$100.00	LS	1	\$100.00		
General Discharge Permit Fee	NA	\$600.00	LS	1	\$600.00		
Annual Air Emission Fee	NA	\$207.00	LS	1	\$207.00		
NONTAXABLE SUBTOTAL					\$3,907.00		
<u>TAXABLE</u>							
PersulfOx (9,037 pounds)	NA	23,495	LS	1	\$23,495.00		
Handling Charge	NA	\$250.00	LS	1	\$250.00		
Estimated Shipping Charge	NA	\$4,312.00	LS	1	\$4,312.00		
Contingency Set-Aside Funds	NA	\$3,758.07	Total	1	\$3,758.07		
TAXABLE SUBTOTAL					\$31,815.07		

APPENDIX B

**SPECIFICATIONS AND MSDS FOR
PERSULFOX™**

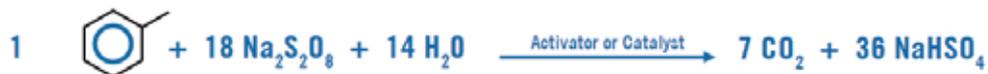


PersulfOx® Application Design Summary		
Turner Branch - Proposal No. BRG60698		
Dissolved Plume		Field App. Instructions
Application Method	Well	Product Cost \$23,494.64 plus shipping and sales tax.
Spacing Within Rows (ft)	n/a	
Spacing Between Rows (ft)	n/a	
Injection Points (per app.)	1	
Number of Applications	2	
Areal Extent (square ft)	900	Field Mixing Ratios
Top Application Depth (ft bgs)	30	Water per Pt per app (gals)
Bottom Application Depth (ft bgs)	60	3068
PersulfOx to be Applied (lbs)	9,036.4	PersulfOx per Pt per app (lbs)
PersulfOx Solution %	15%	4518
Volume Water (gals)	6,136	Total Volume per Pt per app (gals)
Total Volume (gals)	6,588	3294
<i>Per Application Totals</i>		
<i>PersulfOx per app. (lbs)</i>	<i>4,518</i>	<i>Volume per vertical ft (gals)</i>
<i>Volume Water per app. (gals)</i>	<i>3,068</i>	<i>110</i>
<i>Total Volume per app. (gals)</i>	<i>3,294</i>	
Technical Notes/Discussion		
<p>Per our conversation the product will be applied to MPE-1. Use TBMW-27 and MPE-2 as extraction wells to help distribute the PersulfOx. Use and elevated pH as your indicator to stop pulling from the two wells.</p>		
Assumptions/Qualifications		
<p>In generating this preliminary estimate, Regenesis relied upon professional judgment and site specific information provided by others. Using this information as input, we performed calculations based upon known chemical and geologic relationships to generate an estimate of the mass of product and subsurface placement required to affect remediation of the site.</p>		
<p>REGENESIS developed this Scope of Work in reliance upon the data and professional judgments provided by those whom completed the earlier environmental site assessment(s). The fees and charges associated with the Scope of Work were generated through REGENESIS' proprietary formulas and thus may not conform to billing guidelines, constraints or other limits on fees. REGENESIS does not seek reimbursement directly from any government agency or any governmental reimbursement fund (the "Government"). In any circumstance where REGENESIS may serve as a supplier or subcontractor to an entity which seeks reimbursement from the Government for all or part of the services performed or products provided by REGENESIS, it is the sole responsibility of the entity seeking reimbursement to ensure the Scope of Work and associated charges are in compliance with and acceptable to the Government prior to submission. When serving as a supplier or subcontractor to an entity which seeks reimbursement from the Government, REGENESIS does not knowingly present or cause to be presented any claim for payment to the Government.</p>		

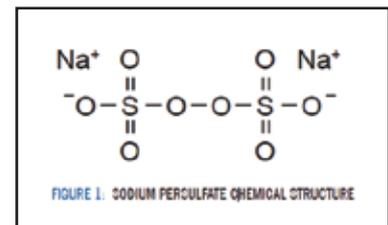
PersulfOx[®] Technical Description

PersulfOx is an *In Situ* Chemical Oxidation (ISCO) reagent that destroys organic contaminants found in groundwater and soil through powerful, yet controlled, chemical reactions. A sodium persulfate-based technology (figure 1), PersulfOx employs a patented catalyst to enhance the oxidative destruction of both hydrocarbons and chlorinated contaminants in the subsurface.

Typically, sodium persulfate is activated with the addition of heat, chelated metals, hydrogen peroxide, or base in order to generate sulfate radicals. These activation processes are inherently complex, costly and can pose additional health and safety risks. In comparison, PersulfOx is a relatively safe and easy-to-use ISCO agent with a built-in catalyst which activates the persulfate component, generating contaminant-destroying free radicals without the need for the addition of a separate activator. The equation below shows the net complete oxidation of toluene, a constituent of gasoline, by PersulfOx:



Example of PersulfOx



For a list of treatable contaminants with the use of PersulfOx, view the [Range of Treatable Contaminants Guide](#)

Chemical Composition

- Sodium Persulfate - CAS #7775-27-1
- Sodium Silicate - CAS #1344-09-8

Properties

- pH - 7 to 11.5 at 25°C
- Appearance - White, free-flowing powder, clear to cloudy when mixed with water
- Odor - Not detectable
- Vapor Pressure - None
- Chemical Hazard Classification - Class 5.1 Oxidizer

Storage and Handling Guidelines

Storage

- Store locked up
- Keep away from heat
- Store in a cool, dry place out of direct sunlight

Handling

- Minimize dust generation and accumulation
- Routine housekeeping should be instituted to ensure that dust does not accumulate on surfaces

PersulfOx[®] Technical Description

Storage (continued)

- Store in original tightly closed container
- Store in a well-ventilated place
- Do not store near combustible materials
- Store away from incompatible materials
- Recommended to store at less than 40°C
- Provide appropriate exhaust ventilation in places where dust is formed

Handling (continued)

- Avoid mixing with combustibles
- Avoid contamination
- Keep away from clothing and other combustible materials
- Wear appropriate personal protective equipment
- Avoid breathing dust
- Avoid contact with eyes, skin, and clothing
- Avoid prolonged exposure
- Do not taste or swallow
- When using, do not eat, drink or smoke
- Wear appropriate personal protective equipment
- Wash hands thoroughly after handling
- Observe good industrial hygiene practices

Applications

- PersulfOx is mixed with water at a rate of 5% to 20% prior to application.
- For most applications, REGENESIS suggests a 10-15% solution. The resulting mixture has viscosity similar to water.
- Injects into formation through direct push injection points, injection wells or other injection delivery systems.

Application instructions for this product are contained here [PersulfOx Application Instructions](#).

Health and Safety

Material is relatively safe to handle; however, avoid contact with eyes, skin and clothing. OSHA Level D personal protection equipment including: vinyl or rubber gloves, eye protection, and dust mask are recommended when handling this product. Please review the Material Safety Data Sheet for additional storage, usage, and handling requirements here: [PersulfOx SDS](#).